

SOME NOTES ON THE LARVAL FEEDING OF
THE ROSY MARSH MOTH:
EUGRAPHE SUBROSEA STEPHENS

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Eugraphe subrosea is a former fenland species apparently quite abundant during the first half of last century in the fens of Huntingdonshire and Cambridgeshire. During the middle years of last century, extensive drainage of the fens drastically reduced its habitat and the insect was considered to have become extinct. In 1965 it was re-discovered in North Wales when a single specimen was captured, and in 1967 it was found in quantity at Borth Bog in Cardiganshire. Studies at this location have revealed that its food plant is bog myrtle (*Myrica gale*), but little else seems to be known of its larval habits or development, or of alternative food plants. In Britain, its only recorded food plant is *Myrica* (Gardiner 1968), but suggested alternatives have been bog rosemary (*Andromeda polifolia*) and heather (*Calluna vulgaris*) and in captivity it is reported to have fed readily on narrow leaved species of willow (*Salix*) (Heath 1979). The larvae are active nocturnally, and considered sensitive to vibration and light, readily dropping from the food plant if disturbed. Little seems to have been recorded of their diurnal habits.

The purpose of this exercise was to attempt to rear the insect from adult to adult in conditions as near natural as possible; to make close observations on its feeding habits and larval development; to attempt to identify alternative food plants, and to photograph the insect at every stage. In order to emulate natural conditions as closely as possible, the undertaking was carried out throughout in front of an open window in an unheated and unused room. Thus, the insects were maintained at the ambient temperature during their entire cycle. In order to simulate precipitation, water was occasionally introduced in the form of a fine spray, and the cage was taken outside during some periods of gentle rain. The bog flora in the cage was maintained in a healthy state by topping up with acid water taken from that environment. As the larvae are nocturnal, it was considered of no importance that their exposure time to sunlight was reduced, and indeed long exposure to sunlight would have been unnatural and dangerous due to the 'greenhouse effect' created by the sides of the cage.

A breeding cage was prepared which contained a cut section of peat and a representative sample of the ground flora. I will not give a complete list of plants in the sample, but confine my remarks to

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those likely to be of significance. Growing in the peat were heather (*Calluna vulgaris*), cross-leaved heath (*Erica tetralix*), bog rosemary (*Andromeda polifolia*) and a number of bog grasses. Introduced as leafed twigs were birch (*Betula pubescens*), common sallow (*Salix cinerea*), eared sallow (*Salix aurita*), and rowan (*Sorbus aucuparia*). No other shrub or tree species were considered significant and none were introduced. Bog myrtle (*Myrica gale*) was deliberately excluded from the experiment.

Experience had shown that males are very readily attracted to light, but females were caught less frequently. However, on 4th August 1982, by using a mercury vapour lamp, several females were captured. They were introduced to the cage, and eggs were laid on the nights of 5 and 6 August. A few days after laying, the females died and were removed. Close examination of the cage contents revealed that eggs had been laid in five batches in the following locations: one batch on a leaf of common sallow, two batches on birch leaves and two batches on the sides of the cage.

In order to assist location of the larvae after hatching, some of the twigs without eggs were removed. It was considered an unnecessary duplication to leave both species of willow, so the *Salix aurita* was removed, together with the rowan. All that remained were the twigs of common sallow and birch which carried the eggs. On the 19 August one batch of eggs on the birch was seen to hatch, followed by the other batch and those on the willow the following day. The eggs on the side of the cage failed to hatch. On hatching, the larvae ate most of their discarded eggshells and then began to disperse. They were minute, pale cream in colour with black dots each bearing a hair or hairs, thus giving a slightly woolly appearance. Locomotion was by looping. Once dispersed, the larvae were almost impossible to find and it was not until the 24/25 August that a few were re-located. A count of the discarded eggshells revealed a hatch of approximately 52 larvae. These had changed little in appearance. Their skins had darkened to a greenish brown, but they were still semi-transparent with small dark brown spots and a dark brown head. They measured about 2mm.

A supply of fresh twigs, of birch, sallow and rowan, was introduced, but the old ones now bearing dead leaves were not removed. *Andromeda polifolia* was present as a constituent of the bog flora throughout the feeding period. At this stage there was no evidence of feeding or of passing into a second instar. They remained undisturbed until 3 September when a further attempt was made to locate them. Some were found which had grown to about 3mm. but they had remained greenish brown, semi-transparent, with dark spots and hairs. None were located on green foliage, all those found were resting on the dead fallen leaves of birch and willow. There was still no evidence of feeding and I was drawn to the conclusion that they spent their first instar in concealment and only begin to feed

later. In recognition of their nocturnal habits, some of these examinations were carried out by day, and some by torchlight after dark.

By 12 September it appeared that the larvae had entered the second instar. They had now grown to 5mm. in length and had become a more uniform light brown above while they had adopted a pale fawn colour on the underside. Separating these two colour zones was a dark brown strip. They seemed marginally more active, locomotion was still by looping, but they were still not observed feeding nor was there any evidence of this on the foliage. They were still mostly found on dead leaves on the floor of the cage, but some were seen on the twigs. On 14 September new foliage was supplied and as the cage was now becoming congested, the old twigs, but not the fallen leaves, were removed. A number of larvae were dislodged from these twigs, by shaking them on to a sheet of white paper. On the 24 September this process was repeated, but little change was observed. There was no change in appearance, no evidence of having entered the third instar and growth had been extremely slow to about 5mm. The larvae were now adopting an attitude of camouflage, aligning themselves with the twigs or with the midribs of the dead leaves. On the foliage removed there had still been no definable sign of feeding, although small patches of the lower cuticle of some of the willow leaves had been removed. I had not witnessed feeding and was unable to say whether this had been done before the twigs were introduced.

During the period up to 4 October the larvae became much more active and were observed feeding nocturnally on the lower cuticle of willow leaves. They stripped the leaf in patches leaving behind a network of ribs and veins and an entire upper cuticle. At the time of changing the foliage (4 October) the discarded leaves of birch and rowan were examined closely, but there was no evidence of feeding, and these species were not replaced. At this time, the larvae measured about 5-7mm. at full stretch, and were mid brown above with a slightly paler middle stripe and fawn below. After a period of feeding during the first half of the second instar, the larvae once again became immobile and for about two weeks remained in a resting position on dead grass stems or along the midribs of dead leaves. During this time, immobility had been interrupted by occasional movements to other parts of the cage. These movements seem to have served no purpose and feeding was not observed again until 12 October. At this point, the three larvae which did begin to feed demonstrated a different mode of feeding. No longer confined to the lower cuticle, they extended their activities to the upper cuticle and to the edge of the leaf, thus attacking its entire substance.

By the 18 October a dozen or so larvae had become much more mobile and had resumed feeding. No more could be located and I assumed that they represented the sum total of the survivors. They

were all feeding on sallow but it was also interesting to note that some of the younger shoots of purple moor grass (*Molinia caerulea*) had also been eaten, although this was never repeated. At this stage the larvae measured 6-7mm. The dorsal half of the body was mid brown in colour but also bore a broad cream central dorsal longitudinal stripe, flanked by two narrower stripes of the same colour. The broad stripe extended across the head which was otherwise dark shining brown. A broad cream stripe with a dark brown upper margin separated dorsal and ventral regions. The lower side of the body was a uniform pale brown. When not feeding, the larvae continued to adopt a resting attitude mainly on the dead leaves of *Molinia*. If disturbed by a sharp jerk, the larvae simply dropped from their perches. Minor disturbance resulted in the adoption of a defensive attitude which involved raising the head and forward part of the body, and then curving the head forward and downward rather in the fashion of the neck of a swan.

On 27 October, the food supply was running out with leaf fall. The foliage was changed but by now the larvae showed little interest and remained in the resting position on leaf or grass. They showed no indication of hibernation or preparation for it. On 31 October two of the larvae were seen to be feeding. On 7 November, all of the larvae shed their skins and entered the third instar. For some, this induced a further attempt to feed but by this time the leaves were rather shrivelled and brown. Their appearance remained the same, but two or three days after ecdysis their size had increased to 9mm. On 13 November a few remaining leaves from their food bush were introduced and some of the larvae fed briefly. Despite some frosty nights during the second half of November the larvae continued to be active and occasionally fed on the remains of the sallow leaves. Throughout most of December night-time temperatures dropped below freezing and the larvae were relatively inactive. However, during this period one of them was observed on the leaves of *Andromeda polifolia*. Towards the end of the month, the minimum temperatures rose and they all became more active. Most of the vegetation in the cage was of poor quality and fresh *Andromeda*, *Calluna* and *Erica* were introduced. At no time did they indicate any interest in *Calluna* or *Erica*, but at this time and throughout a milder January they all fed on *Andromeda* leaves.

February was a colder month and for most of it there was little activity and almost no feeding, the larvae remaining low down on the grass stems or occasionally moving to rest on the willow twigs or on the *Calluna*. Early March was milder, the *Andromeda* began to grow, and the willow produced small catkins. Larval activity increased slightly, but although the larvae moved about the cage fairly freely, there was little sign of feeding. Towards the end of the month the nights became colder and frost was regular, but despite this, activity increased and on 23 March three larvae were feeding

quite vigorously on *Andromeda* leaves, and one had taken up station on a willow flower. Activity increased slowly throughout April but it was not until late in the month when vigorous feeding was resumed on the *Andromeda*. At this time there were considerable differences in the size of the larvae, but with renewed feeding they rapidly increased in size. On the 17 April some willow twigs were introduced which bore opening buds. After a few days some of the larvae transferred their attentions to the developing willow leaves. From this point, growth was rapid and by early May, all seven larvae had entered the fourth instar, and were feeding voraciously on willow leaves and flowers.

Towards the end of the fourth instar the larvae measured $2\frac{1}{2}$ -3 cms. Colours had become more regularly distributed in stripes and in descending order they were a narrow pale cream dorsal stripe, followed by a pale chocolate one of greater width. Three narrow stripes, all of approximately equal width and fairly narrow were respectively cream, light brown and dark brown, and were followed by a broad white band, with a very dark brown lower edge. Below this, the entire underside was pink. On the 11 May, skin colours began to darken and between 12 and 15 May all seven larvae entered their fifth instar. During this fifth and final instar, their bodily colour arrangement was the same as the previous instar, but the stripes were bolder and more pronounced, producing a very handsome caterpillar. They fed voraciously throughout the instar both day and night and achieved a length of $4\frac{1}{2}$ cms. On 26 May the larvae showed signs of pre-pupation by excavating small chambers in the Sphagnum or surface layer of the peat. Each larva enters its chamber and pupates without preparing a cocoon. At first the pupa is cream in colour but quickly darkens to become dark brown. Pupation was complete by 3 June. During pupation the vegetation in the cage was kept moist by leaving it occasionally in the rain.

On the night of 16 July, the first three adults emerged, they being two males and one female. The night of the 18 July saw two more emergences, one of each sex. This was repeated on the night of 22 July. One female was malformed with permanently crumpled wings and died on 27 July, and about 260 eggs were laid between 29 July and 1 August. The death of two males and one female followed quickly and the remaining adults were liberated.

References

- Gardiner, B. O. C. 1968. On *Coenophila subrosea* (Stephens) (Lep., Noctuidae). *Ent. Gaz.*, 19: 251-255.
Heath, J. et al. 1979. *The Moths and Butterflies of Great Britain and Ireland*. Vol. 9.